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L1: Entry 4 of 14

File: JPAB

Jan 26, 1980

PUB-NO: JP355011329A  
DOCUMENT-IDENTIFIER: JP 55011329 A  
TITLE: SEMICONDUCTOR DEVICE

PUBN-DATE: January 26, 1980

INVENTOR-INFORMATION:

COUNTRY

NAME

YAMAZAKI, SHUNPEI

US-CL-CURRENT: 257/56; 257/62, 257/63, 257/65, 257/74, 257/75, 257/77, 257/616  
INT-CL (IPC): H01L 31/10; H01L 29/00

## ABSTRACT:

PURPOSE: To make it possible to vary energy band continuously, by providing a non-single crystal semiconductor containing an additive capable of varying energy band, on a non-single crystal semiconductor having one conducting type.

CONSTITUTION: Amorphous or polycrystalline non-single crystal film is formed on a semiconductor or insulator by using a material which becomes a semiconductor, such as silicon, silane, dichlorosilane, and other silified gas. Next, on top of this is formed a non-single crystal film consisting of silicon to which hydrogen, heavy hydrogen, or a halogen compound such as of chlorine. These substances bond with the unpaired bonding hands of silicon and suppress the occurrence of re-bonding center and perform neutralization electrically. Further, carbon, nitrogen and oxygen are equally dispersed and added to the semiconductor. As a result, there is no specific boundary level, and the energy band assumes continuity or smooth discontinuity. For semiconductor material, germanium, silicon carbide, or compound semiconductor, besides silicon, may be used.

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L14: Entry 2 of 10

File: JPAB

Mar 10, 1998

PUB-NO: JP410070091A  
DOCUMENT-IDENTIFIER: JP 10070091 A  
TITLE: MANUFACTURE OF SEMICONDUCTOR DEVICE

PUBN-DATE: March 10, 1998

INVENTOR-INFORMATION:

NAME

DOI, TSUKASA

COUNTRY

ASSIGNEE-INFORMATION:

NAME

SHARP CORP

COUNTRY

APPL-NO: JP08226381

APPL-DATE: August 28, 1996

INT-CL (IPC): H01L 21/285; H01L 21/768

## ABSTRACT:

PROBLEM TO BE SOLVED: To solve the problem that sheet resistance just after film formation changes with time and is not stabilized in a titanium nitride film formed by using TDMAT(tetrakisdimethylamino titanium) as material.

SOLUTION: A part of a silicon oxide film 2 formed on the surface of a silicon substrate 1 is opened, and a contact hole is formed. After a titanium film 3 is formed by a sputtering method or a CVD method, a titanium nitride film 4 is formed. Without exposure to the atmosphere, i.e., the silicon substrate is not exposed to atmospheric air. At 420°C, monosilane (SiH<sub>4</sub>) only, i.e., 100% of SiH<sub>4</sub> is treated for reaction for 30-90 seconds, at a flow rate of 50sccm and a pressure of 10Torr. A tungsten plug is formed after tungsten 5 is formed. A titanium film is formed after the contact hole is formed. The titanium nitride film which is formed by using organic titanium compound excellent in step coverage to a fine contact hole is heat-treated in a silane atmosphere. Thereby a titanium nitride film whose sheet resistance is stable and low can be formed in the contact hole.

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File: TDBD

Apr 1, 1991

L2: Entry 2 of 6

TDB-ACC-NO: NN9104352

DISCLOSURE TITLE: Oxide-Free Dielectric/GaAs Interface With No Excess As.

PUBLICATION-DATA:  
IBM Technical Disclosure Bulletin, April 1991, US

VOLUME NUMBER: 33  
ISSUE NUMBER: 11  
PAGE NUMBER: 352

PUBLICATION-DATE: April 1, 1991 (19910401)

CROSS REFERENCE: 0018-8689-33-11-352

DISCLOSURE TEXT:

- Disclosed are processes which prevent Au movement between Au-based ohmic contacts and a Schottky gate. This phenomena, due to surface instabilities between ohmic contact and gate, is attributed to GaAs native oxides and excess As formed at dielectric/GaAs interface. The processes disclosed here produce an oxide-free interface with no excess As. - One process uses a H<sub>2</sub> and N<sub>2</sub> plasma treatment before dielectric deposition (1). The plasma treatment which removes any residual oxide and excess As is performed after the GaAs native oxides are removed by wet etch. In a second process, the native oxides are removed by wet etch and H<sub>2</sub> plasma; then a thin Si layer to prevent surface oxidation is deposited by PECVD of SiH<sub>4</sub> before dielectric deposition (2). - References (1) A. Callegari, D. Lacey, D. A. Buchanan, E. Latta, M. Gasser, and A. Paccagnella "Surface studies of GaAs treated by hydrogen and nitrogen rf plasma," Int. Symp. GaAs and Related Compounds, Karuizawa, Japan (1989). (2) A. Paccagnella, A. Callegari, J. Batey, and D. Lacey, "Properties and thermal stability of the SiO<sub>2</sub>/GaAs interface with different surface treatments," Applied Phys. Lett. 57, 258 (1990).

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L5 ANSWER 4 OF 5 INSPEC COPYRIGHT 2001 IEE  
 AN 1994:4822697 INSPEC DN A9424-8115H-060; B9412-0520F-082  
 TI Influence of wafer preclean before selective tungsten CVD on surface  
 properties of interconnect and intermetal dielectric materials.  
 AU Schulz, S.E.; Hintze, B.; Grunewald, W. (Fakultet fur Elektronik und  
 Informationstechnik, Tech. Univ. Chemnitz, Germany); Hofmann, A.  
 SO Physica Status Solidi A (16 Oct. 1994) vol.145, no.2, p.311-18. 5 refs.  
 CODEN: PSSABA ISSN: 0031-8965  
 Conference: 4th International Symposium on Trends and New Applications in  
 Thin Films - TATF '94 and the 11th Conference on High Vacuum, Interfaces,  
 and Thin Films - HVITF '94. Dresden, Germany, 7-11 March 1994  
 Sponsor(s): Deutsche Forschungsgemeinschaft; Comm. Eur. Union  
 DT Conference Article; Journal  
 TC Experimental  
 CY Germany, Federal Republic of  
 LA English  
 AB Results of selective tungsten CVD on titanium nitride  
 (TiN) are summarized. The investigations are focused on the  
 influence of precleaning and tungsten nucleation on the TiN and  
 SiO<sub>2</sub> surface, the CVD-W/TiN interface and the electrical  
 properties of the contacts (via resistance). After a combination of HF  
 dip and NF<sub>3</sub> plasma a remarkable amount of fluorine was detected at the  
 TiN surface which was not bound to Ti. This process showed the  
 best effect on the reproducible nucleation of tungsten. No interfacial  
 layer could be found by cross section TEM after the tungsten nucleation.  
 But in the case of nucleations starting with SiH<sub>4</sub> gas inlet  
 tungsten growth begins with the formation of a mixture of alpha - and  
 beta -phase tungsten. More far away from the interface region only alpha -W  
 was detected. The lowest via resistances in filled vias were measured for  
 nucleations starting with WF<sub>6</sub> gas inlet. For introducing SiH<sub>4</sub>  
 first the via resistance could be decreased using a H<sub>2</sub> plasma  
 conditioning of the wafer in the deposition chamber after dry  
 pretreatments. For this case no remarkable change of the deposition  
 surface was found by XPS. At wafers pretreated with BCl<sub>3</sub>/N<sub>2</sub>  
 plasmas on both surfaces (TiN and SiO<sub>2</sub>) boron nitride was found.  
 CC A8115H Chemical vapour deposition; A6855 Thin film growth, structure, and  
 epitaxy; A7340C Contact resistance, contact potential, and work  
 functions;  
 B0520F Vapour deposition; B2550F Metallisation; B2550E Surface treatment  
 CT CHEMICAL VAPOUR DEPOSITION; CONTACT RESISTANCE; METALLISATION;  
 NUCLEATION;  
 SURFACE TREATMENT; TRANSMISSION ELECTRON MICROSCOPE EXAMINATION OF  
 MATERIALS; TUNGSTEN; X-RAY PHOTOELECTRON SPECTRA  
 ST wafer preclean; selective W CVD; surface properties; intermetal  
 dielectric  
 materials; interconnects; TiN; nucleation; SiO<sub>2</sub> surface;  
 CVD-W/TiN interface; electrical properties; via resi